Multifractal analysis of laser Doppler flowmetry signals before and after arm-cranking exercise in an older healthy population

Titre	Multifractal analysis of laser Doppler flowmetry signals before and after arm-cranking exercise in an older healthy population
Type de publication	Article de revue
Auteur	Klonizakis, Markos [1], Humeau-Heurtier, Anne [2]
Editeur	American Association of Physicists in Medicine
Type	Article scientifique dans une revue à comité de lecture
Année	2013
Langue	Anglais
Date	Jan-02-2013
Numéro	2
Pagination	020702
Volume	40
Titre de la revue	Medical Physics
ISSN	0094-2405
Mots-clés	Arm/physiology [3], Computer-Assisted [4], Endothelium/metabolism [5], Exercise [6], Female [7], Fractals [8], health [9], Humans [10], Laser-Doppler Flowmetry/methods [11], Male [12], Middle Aged [13], Nitric Oxide/metabolism [14], Signal processing [15]

Résumé en anglais	PURPOSE: There is a lot of speculation about the role of nitric-oxide (NO) in the improvement usually noticed in microcirculatory function, following exercise. The knowledge of the underlying mechanisms leading to such an improvement is important as it may help in targeting and implementing therapies for microcirculatory diseases. Through a laser Doppler flowmetry (LDF) signal processing study, the authors' goal is to compare multifractal spectra of LDF data recorded in both lower leg and forearm, during different exercise conditions, in an older, untrained but healthy population. METHODS: Using the method suggested by Halsey et al. [Phys. Rev. A 33, 1141-1151 (1986)], multifractal spectra of LDF signals recorded on lower leg and forearm before and after exercise (arm-cranking), before and after acetylcholine (ACh) iontophoresis, were determined on scales in relation with the NO-dependent endothelial activity. The width of each multifractal spectrum was then computed through the maximum and minimum Holder exponent values for which the multifractal spectrum reaches its minimal values. The results were then compared. RESULTS: Following exercise and on the scales studied, the average width of the multifractal spectra in both lower leg and forearm does not vary significantly before and after ACh iontophoresis. Similarly, following ACh iontophoresis and exercise, the average width of multifractal spectra remains statistically unchanged, when compared to that measured prior to exercise, in both upper and lower body, although negative trends can be observed. CONCLUSIONS: For the authors' population and for the type of exercise that the authors have chosen, the authors showed that the width of the multifractal spectra of LDF signals does not change significantly on scales in relation with the NO-dependent endothelial activity. Future studies may involve comparisons with signals obtained in patient populations.
URL de la notice	http://okina.univ-angers.fr/publications/ua3416 [16]
DOI	10.1118/1.4774362 [17]
Lien vers le document	http://dx.doi.org/10.1118/1.4774362 [17]
Titre abrégé	Med. Phys.

Liens

[1] http://okina.univ-angers.fr/publications?f[author]=4728
[2] http://okina.univ-angers.fr/a.hum/publications
[3] http://okina.univ-angers.fr/publications?f[keyword]=13633
[4] http://okina.univ-angers.fr/publications?f[keyword]=14081
[5] http://okina.univ-angers.fr/publications?f[keyword]=13634
[6] http://okina.univ-angers.fr/publications?f[keyword]=13424
[7] http://okina.univ-angers.fr/publications?f[keyword]=1075
[8] http://okina.univ-angers.fr/publications?f[keyword]=3263
[9] http://okina.univ-angers.fr/publications?f[keyword]=1859
[10] http://okina.univ-angers.fr/publications?f[keyword]=991
[11] http://okina.univ-angers.fr/publications?f[keyword]=12887
[12] http://okina.univ-angers.fr/publications?f[keyword]=968
[13] http://okina.univ-angers.fr/publications?f[keyword]=5941
[14] http://okina.univ-angers.fr/publications?f[keyword]=13205
[15] http://okina.univ-angers.fr/publications?f[keyword]=5964
[16] http://okina.univ-angers.fr/publications/ua3416
[17] http://dx.doi.org/10.1118/1.4774362